

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:
Robin Cheung, et al.

Serial No.: 10/686.486

Confirmation No.: 8014

Filed: October 15, 2003

For: Apparatus for Electro
Chemical Deposition of
Copper Metallization with
the Capability of In-Situ
Thermal Annealing

Group Art Unit: 1742

Examiner: Harry D. Wilkins, III

MAIL STOP APPEAL BRIEF - PATENTS
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January 22, 2007
Date

Nan Z Carr

APPEAL BRIEF

Applicants submit this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1742 dated May 26, 2006, finally rejecting claims 1-20. The final rejection of claims 15 and 20 is appealed. This Appeal Brief is believed to be timely since mailed by the due date of January 22, 2007, as set by mailing a Notice of Appeal on November 21, 2006. Authorization to charge the fee of \$500.00 for filing this brief is provided on a separate fee transmittal. Please charge any additional fees that may be required to make this Appeal Brief timely and acceptable to Deposit Account No. 20-0782/APPM/003421.C2/KMT.

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Real Party in Interest

The present application has been assigned to Applied Materials, Inc., 3050 Bowers Avenue, Santa Clara, California 95054.

Related Appeals and Interferences

Applicants assert that no other appeals or interferences are known to the Applicants, the Applicants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 15 and 20 are pending in the application. Claims 1-9 were originally presented in the application. Claims 1, 4 and 9 were amended and claims 10-20 were added in the Response to Office Action dated January 11, 2006, that was filed April 11, 2006. Claims 1-20 were finally rejected by the Examiner in the Final Office Action dated May 26, 2006. Claims 1-14 and 16-19 were cancelled, and claims 15 and 20 were amended after final rejection to independent form to include all the limitations from cancelled dependent claims. The final rejections of claims 15 and 20 are appealed. The pending claims are shown in the attached Claims Appendix.

Status of Amendments

All claim amendments have been entered by the Examiner. Applicants' response after final rejection cancelled all claims except claims 15 and 20 and was entered after filing Notice of Appeal.

Summary of Claimed Subject Matter

The present invention generally relates to an electrochemical deposition system (paragraph [0012]).

One embodiment of the invention, as recited in claim 15, provides an electrochemical deposition system (paragraphs [0037]-[0038]) comprising a mainframe (Figures 2 and 3, element 214) having a mainframe wafer transfer robot (Figures 2 and 3, element 216) disposed therein, a loading station (Figures 2 and 3, element 210) disposed in connection with the mainframe, wherein the loading station comprises one or more loading station robots (Figures 2 and 3, element 228), one or more processing stations (Figures 2 and 3, element 240) disposed in connection with the mainframe, wherein each processing station comprises one or more electrochemical deposition cells (Figure 6, element 400, and paragraph [0051]), and one or more post deposition treatment chambers (Figures 2 and 3, element 211) disposed in connection with the mainframe, wherein the one or more post deposition treatment chambers comprise one or more rapid thermal anneal chambers, one or more thermal anneal chambers (Figure 17, paragraphs [0093]-[0097]), or a combination thereof.

Another embodiment of the invention, as recited in claim 20, provides an electrochemical deposition system (paragraphs [0037]-[0038], comprising a mainframe (Figures 2 and 3, element 214) having a mainframe wafer transfer robots robot (Figures 2 and 3, element 216) disposed therein, a loading station (Figures 2 and 3, element 210) disposed in connection with the mainframe, wherein the loading station comprises one or more cassette receiving areas (Figures 2 and 3, element 224), two or more processing stations (Figures 2 and 3, element 240) disposed in connection with the mainframe, wherein each processing station comprises two or more electrochemical deposition cells (Figure 6, element 400, and paragraph [0051]), and two or more post deposition treatment chambers (Figures 2-3, elements 211-212) in connection with the loading station, wherein the two or more post deposition treatment chambers comprise one or more thermal anneal chambers (Figure 17, paragraphs [0093]-[0097]), and two

or more spin-rinse-dry modules (Figures 4-5, element 236, paragraphs [0039]-[0040]), and one or more loading station robots (Figures 2-3, element 228) transfer wafers between the one or more cassette receiving areas and the two or more post deposition treatment chambers, as recited in claim 20.

Grounds of Rejection to be Reviewed on Appeal

1. Claims 15 and 20 stand rejected under 35 U.S.C. § 102(e) as being anticipated by *Dordi et al* (U.S. Patent No. 6,258,220, hereafter *Patent'220*), *Dordi et al* (U.S. Patent No. 6,635,157, hereafter *Patent'157*), *Dordi et al* (U.S. Patent Publication No. 2002/0029961, hereafter *Pub'961*), *Dordi et al* (U.S. Patent Publication No. 2004/0084301, hereafter *Pub'301*), and *Dordi et al* (U.S. Patent No. 6,267,853, hereafter *Patent'853*).

2. Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Yoshioka et al* (U.S. Patent No. 5,297,910, hereafter *Yoshioka*), in view of *Bleck et al* (U.S. Patent No. 5,980,706, hereafter *Bleck*) and *Uzoh et al* (U.S. Patent No. 6,123,825, hereafter *Uzoh*).

3. Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Yoshioka* in view of *Bleck*, *Shinbara* (U.S. Patent 6,155,275, hereafter *Shinbara*), and *Uzoh*.

ARGUMENTS

1. Argument with respect of claims 15 and 20 being rejected under 35 U.S.C. § 102(e) as being anticipated by *Patent*'220, *Patent*'157, *Pub*'961, *Pub*'301, and *Patent*'853.

THE EXAMINER ERRED IN REJECTING CLAIMS 15 AND 20 UNDER 35 U.S.C. §102(e) BECAUSE THE REFERENCES DO NOT QUALIFY AS PRIOR ART UNDER 35 U.S.C. §102(e).

Applicants have amended the specification and submitted a petition to correct priority, which would give the present application an effective filing date of March 5, 1999.

Patent'220 has a priority date of April 8, 1999.

Patent'157, *Pub*'961 and *Pub*'301 cite *Patent*'220, filed April 8, 1999, and provisional application No. 60/110,209, filed November 30, 1998. However, with respect to the claims for the present invention, *Patent*'157, *Pub*'961 and *Pub*'301 can only be considered prior art as of April 8, 1999 because the earlier provisional application for which they claim priority does not disclose or claim the subject matter of claims 15 and 20 of the present invention. For example, provisional application No. 60/110,209 does not disclose the use of a thermal anneal chamber. Therefore, with respect to the use of a thermal anneal chamber, *Patent*'157, *Pub*'961 and *Pub*'301 have an effective filing date of April 8, 1999, which is later than March 5, 1999, the effective filing date of the present application.

Patent'853 has a priority date of July 9, 1999

Thus, the aforementioned references do not qualify as prior art under 35 U.S.C. § 102(e). Withdrawal of the rejection is respectfully requested.

2. Argument with respect of claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Yoshioka*, in view of *Bleck* and *Uzoh*.

THE EXAMINER ERRED IN REJECTING CLAIM 15 UNDER 35 U.S.C. §103(a) BECAUSE THE COMBINED REFERENCES DO NOT TEACH OR SUGGEST ONE OR MORE THERMAL ANNEAL CHAMBERS IN CONNECTION WITH A MAINFRAME.

Applicants respectfully traverse this rejection.

Yoshioka teaches a system for treatment of semiconductor wafers including a mainframe having a transfer robot therein. However, *Yoshioka* does not teach or suggest one or more rapid thermal anneal chambers, or one or more thermal anneal chambers in connection with a mainframe, as set forth in claim 15.

Bleck teaches processing stations for semiconductor wafers wherein an electrochemical deposition treatment was carried out. However, *Bleck* does not teach or suggest one or more rapid thermal anneal chambers, or one or more thermal anneal chambers in connection with a mainframe, as set forth in claim 15.

Uzoh teaches an electromigration-resistant copper film structure and the process for forming the structure (Abstract). However, while *Uzoh* does teach a process involving an annealing step, it does not teach or suggest *combining* the structure that performs the annealing step with the structure that performs the previous steps. The Examiner admits that *Uzoh* does not even mention positioning the annealing station adjacent, let alone in connection with, a mainframe; however, the Examiner asserts that it would have been obvious to place the annealing station at any convenient location with respect to the apparatus, such as in connection with the mainframe as recited in claim 15. Absent some motivation or suggestion of the claimed subject matter, the Examiner uses impermissible hindsight in combining the elements of these three references together.

Therefore, *Yoshioka*, *Bleck* and *Uzoh*, alone or in combination, do not teach, show or suggest an electro-chemical deposition system comprising a mainframe having a mainframe wafer transfer robot disposed therein, a loading station disposed in

connection with the mainframe, wherein the loading station comprises one or more loading station robots, one or more processing stations disposed in connection with the mainframe, wherein each processing station comprises one or more electrochemical deposition cells, and one or more post deposition treatment chambers disposed in connection with the mainframe, wherein the one or more post deposition treatment chambers comprise one or more rapid thermal anneal chambers, one or more thermal anneal chambers, or a combination thereof, as recited in claim 15.

Withdrawal of the rejection is respectfully requested.

3. Argument with respect of claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Yoshioka* in view of *Bleck*, *Shinbara*, and *Uzoh*.

THE EXAMINER ERRED IN REJECTING CLAIM 15 UNDER 35 U.S.C. §103(a) BECAUSE THE COMBINED REFERENCES DO NOT TEACH OR SUGGEST ONE OR MORE THERMAL ANNEAL CHAMBERS AND TWO OR MORE SPIN-RINSE-DRY CHAMBERS IN CONNECTION WITH A LOADING STATION.

Applicants respectfully traverse this rejection.

Yoshioka, *Bleck*, and *Uzoh* are described above. The combination of *Yoshioka*, *Bleck*, and *Uzoh* does not teach or suggest one or more rapid thermal anneal chambers and two or more spin-ring-dry chambers in connection with a loading station, as set forth in claim 20.

Shinbara teaches a spin-rinse-dry station for cleaning wafers after processing. However, combination of *Shinbara* with *Yoshioka*, *Bleck*, and *Uzoh* does not teach or suggest one or more rapid thermal anneal chambers and two or more spin-ring-dry chambers in connection with a loading station, as set forth in claim 20. Absent some motivation or suggesting of the claimed subject matter, the Examiner uses impermissible hindsight in combining the element of these four references together.

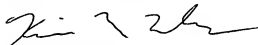
Therefore, *Yoshioka*, *Bleck*, *Shinbara* and *Uzoh*, alone or in combination, do not teach, show or suggest an electro-chemical deposition system, comprising a mainframe having a mainframe wafer transfer robots disposed therein, a loading station disposed in connection with the mainframe, wherein the loading station comprises one or more cassette receiving areas, two or more processing stations disposed in connection with the mainframe, wherein each processing station comprises two or more electrochemical deposition cells, and two or more post deposition treatment chambers in connection with the loading station, wherein the two or more post deposition treatment chambers comprise one or more thermal anneal chambers, and two or more spin-rinse-dry modules, and one or more loading station robots transfer wafers between the one or more cassette receiving areas and the two or more post deposition treatment chambers, as recited in claim 20.

Withdrawal of this rejection is respectfully requested.

CONCLUSION

For the reasons presented above, Appellants respectfully submit that the rejections over claims 15 and 20 are improper. Reversal of the rejections is respectfully requested.

Respectfully submitted,



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CLAIMS APPENDIX

1-14. (Cancelled)

15. (Previously Presented) An electro-chemical deposition system, comprising:
- a mainframe having a mainframe wafer transfer robot disposed therein;
 - a loading station disposed in connection with the mainframe, wherein the loading station comprises one or more loading station robots;
 - one or more processing stations disposed in connection with the mainframe, wherein each processing station comprises one or more electrochemical deposition cells; and
 - one or more post deposition treatment chambers disposed in connection with the mainframe, wherein the one or more post deposition treatment chambers comprise one or more rapid thermal anneal chambers, one or more thermal anneal chambers, or a combination thereof.

16-19. (Cancelled)

20. (Previously Presented) An electro-chemical deposition system, comprising:
- a mainframe having a mainframe wafer transfer robots disposed therein;
 - a loading station disposed in connection with the mainframe, wherein the loading station comprises one or more cassette receiving areas;
 - two or more processing stations disposed in connection with the mainframe, wherein each processing station comprises two or more electrochemical deposition cells; and

two or more post deposition treatment chambers in connection with the loading station, wherein the two or more post deposition treatment chambers comprise one or more thermal anneal chambers and two or more spin-rinse-dry modules,

wherein one or more loading station robots transfer wafers between the one or more cassette receiving areas and the two or more post deposition treatment chambers.

EVIDENCE APPENDIX

No evidence is submitted.

RELATED PROCEEDINGS APPENDIX

No copies of decisions rendered by a court or the Board in the related appeal or interference listed have been identified.